भारत सरकार

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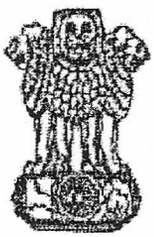
MINISTRY OF RAILWAYS



सत्यमेव जयते

TECHNICAL SPECIFICATIONS FOR TRACK BASED LUBRICATORS (ELECTRONIC & HYDRAULIC TYPE)

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अनुसंधान अभिकल्प एवं मानक संगठन लखनऊ - 11

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PREFACE

1.0 Para 427(2) of IRPWM provides that Rail flange lubricators should be provided on curves of radius 600 meters and less on Broad Gauge to avoid Rail face wear. Trial was undertaken with Hydraulic, electronic with AC power and electronic with solar power lubricators on sharp curves in ghat sections. Based on experience of trial and inputs from various stake holders, the "Technical specification for Track Based Lubricators (Electronic & Hydraulic Type) was prepared by RDSO.

2.0 The Basic dispensing system of lubricant is almost similar for both Electronic and Hydraulic types of lubricating systems. During Trial, it was observed that electronic lubricators both with AC power and with solar power have exhibited better control in dispensing the lubricant resulting in lesser wastage of lubricant compared to hydraulic type. AC powered electronic lubricators can be provided on electrified routes, while Solar powered electronic lubricators can be provided on other routes. Hydraulic type lubricators may be provided preferably on sections having less GMT where electricity is not available.

3.0 Railways shall undertake procurement of track mounted gauge face lubricators as per their requirement to meet the provisions of IRPWM. The gauge face lubrication on mild curves shall also be necessary in area where Rail grinding is being done. While undertaking procurement, zonal railways shall also ensure that

(i) Adequate arrangement is made for Lubricant to be used with lubricators to avoid idling. Performance Parameters of Lubricant to be used in Lubricators have been laid down in the specification.

(ii) The availability of friction measurement equipment shall be ensured for measurement of friction between rail and wheel to judge the efficacy of lubricant and lubricators installed for the purpose.

(iii) Adequate arrangement of operation and maintenance of lubricators.

TECHNICAL SPECIFICATION OF TRACK BASED LUBRICATORS (Electronic Type)

1.0 SCOPE

This specification covers the description, functional and performance parameters of electronic track based lubricators for gauge face lubrication. The delivery system should be specifically designed to apply lubricant on curves under different environmental and traffic conditions on Indian Railways.

2.0 DEVIATIONS

The tenderer shall furnish compliance or deviations, if any, for each clause and sub clause of the specifications along with technical explanations/details. The tenderer shall also furnish financial implications of the deviations if any.

3.0 SERVICE CONDITIONS

3.1 System should be able to work under following service conditions:

i	Ambient temperature	:	0^0C to 50^0C
ii	Rail temperature	:	(-) 10^0C to (+) 75^0C
iii	Humidity	:	40-100%
iv	Rainfall	:	Fairly heavy
v	Atmospheric condition	:	Very dusty, heavy fog

3.2 On IR network the electrified traction consists of overhead electric system of either 25000 V AC or 1500 V DC with residual return current passing through one of the rails in the track. The voltage for track circuits for signaling purpose is up to 12 volts and the corresponding current upto 1 amp. passes through the other rail. The lubricator system should be able to work in above stated electric traction and signaling system and its induction effect.

3.3 The lubricator system should be such that it does not affect the signaling system.

3.4 The firm should offer proven technology with lubricator and lubricant supplied by them and working satisfactorily in any reputed railway system of the world of similar environment prevailing in India. Certificate in this regard from relevant railway system shall be furnished.

4.0 DOCUMENTS TO BE SUPPLIED

i. Installation Manual
ii. Maintenance Manual
iii. Service Manual
iv. Part Manual

5.0 FUNCTION

The applicator system should be an electrically powered pumping system for delivering an adjustable quantity of lubricating material to the rails in a manner such that passing wheels, either all or nominated would carry the designed amount of lubricant along the gauge face of rails.

6.0 SYSTEM DESCRIPTION

The application system must be proven system and should be functional in all climatic conditions in India.

The application system should consist of a rail-mounted sensor, a control box, an AC to DC converter or solar-charged battery, a motor, a pump, a tank with a cover and a material distribution system of hoses and applicators attached to the rails. The whole system should be compatible with the lubricant as defined in para 8.0 of this specification.

The system should operate as passing wheels enter magnetic or such field of the rail-mounted sensor. The sensor should transmit a signal back to the control box. After counting the number of signals from the sensor and when the pre-selected total is reached, the control box should turn on the pump for the pre-selected duration. The material should be pumped through a main hose to a central distribution manifold where it may split into distribution hoses that connect to the multi-ported applicators, clamped to the rail i.e. the application of the lubricant to the rail should be of non-squirting type. The product should then travel to the dispensing ports of each applicator to deliver controlled amounts of product onto the rails. The product should then be picked-up by passing train wheels. The arrangement should be such that the optimum product distribution take place both along circumference of wheel flange as well as longitudinally along gauge face of rail.

7.0 MAJOR COMPONENT SPECIFICATIONS

7.1 Wheel Sensor

Wheel passage should be determined by a disturbance to the localized magnetic flux or such field established by the sensor. Disturbance of the magnetic flux or such field should induce a voltage signal indicating a passing wheel.

Assembly to the rail should not require machining of the rail.

The control circuit should be designed to accept voltage signals for speeds as low as 10 kmph and should be able to function properly up to speed of 200 kmph.
Sensors should be available from the equipment manufacturer in configuration allowing for (1) bi-directional traffic without special

requirements, (2) for use in environments where stray currents from power lines or buried cables may cause false detection of wheel passage, and (3) single-direction traffic activation.

7.2 Power Supply

Application system should be designed to accommodate both direct electrical connection to an AC power source, and to operate independently using a solar panel and battery.

(a) AC Power

Unit should also be workable with 230 volts, 50 Hz. Supply. It should be able to withstand voltage fluctuation in the range of 180-260 volts.

(b) Solar Power

The unit should be supplied with a solar panel and battery system. The solar panel should be able to charge a sealed, deep-cycle battery designed for extended use outdoors without high wattage recharging. Erection of solar panel should be done in a manner so as to prevent vandalism. To prevent theft / for protection of solar panel it should be mounted on minimum 8.5 meter high mast, suitably protected by barbed wires or other suitable means. Solar panel should also be protected against damage from brick batting etc.

The solar panel post should be fixed on suitably designed foundation and provided with lightening protection arrangement, if required. Solar panel post should be enclosed / surrounded by masonry wall with wire fencing on its top.

7.3 Electronic Control Circuit

The control circuit should serve to coordinate all operational functions of applicators, meeting a wide variety of application needs and conditions.

Specific performance and functional requirements are:

Operating Voltage:	Minimum 12 Volts DC
Circuiting Protection:	Minimum 15-amp fuse
Operating Temperature:	Ambient temperature 0^0C to 50^0C or Rail Temperature (-) 10^0C to (+) 75^0C.
Enclosures:	NEMA 4 Rated or equivalent.
Sensitivity:	Factory Set A 3.5 Volts DC (may be adjusted lower to accommodate slower speed trains, with a corresponding sacrifice of accuracy.)

Counter Circuit:	Should activate counter with every passage of wheel. It should be possible to incorporate a skip count feature to activate motor selectively after passage of selected number of wheels so as to minimize the consumption of lubricant and maximize use of lubricant applied.
Timer Circuit:	Should allow selection of variably timed motor activation cycle for maximizing the utilization of lubricant applied and minimize its consumption. Circuit should also provide for a constant setting used to prime the system.

The control circuit should have the capability to operate the motor for traffic in both directions or in a single direction when used with the appropriate wheel sensor.

For security of the installation, the tank lid should be openable to access the controls but duly locked. The vendor has to provide satisfactory solution to make complete unit theft / vandalism proof and safety against damage to any part of the equipment. The steel tank containing the complete equipment including control panel etc. should be enclosed in a suitably designed concrete/ masonry room having separate door with lock and key arrangements. The above planning and execution of work is to be done by vendor himself along with installation of the equipment. If required, vendor is to submit the necessary drawings to comply this requirement.

The system should have separate controls to allow the selection of the interval, based on wheel counts, between each activation and to select the duration of the motor "on" cycle.

The motor should be capable of activation on demand for maintenance and test purposes.

A signal lamp should illuminate when motor is activated and another to illuminate when the sensor is tripped.

It should have arrangement for anti-vandalism and anti-theft features.

7.4 Electric Motor

The electric motor powering the pump should be directly coupled to the pump and designed to operate on minimum 12 volts DC. Electric motor should incorporate a suitable arrangement to coordinate with the speed requirements of the pump.

7.5 Pump

The pump should be efficient and compact. It should require little and easy maintenance and also easy to prime. Pump should be capable of handling a wide range of viscosities, from the stiffest of lubricant to the most fluid one. Pump should be able to produce adequate minimum pressure required for pumping the desired quantity of lubricant from the lubricant chamber to track rail gauge face for various lifts/heights as per site conditions during passage of train and to perform all the functions of gauge face lubricator. Pump should be mounted in such a way that the pump's inlet port mates directly to tank's outlet near bottom of tank. Between the pump and material there should be a large mesh screen. The supplier will submit the detailed specifications of pump for technical scrutiny of the offer.

7.6 Lubricant Distribution System

Shut off valve or any other suitable lubricant distribution system should be used to control the flow of lubricant to the applicators. Distribution system should be efficient, able to distribute the lubricant evenly. It should preferably have minimum moving parts. It should require minimum and easy maintenance.

7.7 Hose

Hoses used with the application system should be connected via screw-type connections to the tank and manifold.

Specific performance and functional requirements are:

Outlet hose:	May be wire-braided.
Distribution hoses:	Must be non-conductive type hose.
Inner Tube:	Suitable Oil Resistant Material.
Cover Construction:	Suitable Oil Resistant Material.
Reinforcement:	Suitably reinforced.
Temperature Range:	Ambient temperature 0^0C to 50^0C or Rail Temperature (-) 10^0C to (+) 75^0C.
Burst Press Min.:	84.37 Kgf/ cm^2 (1200 Psi)
Fittings:	Cast or forged brass alloy end fittings with cast or spun brass ferrules.

Manifold valve handles should be removable for easy storage in the dry chamber of the tank.

Distribution hoses should be long enough to supply applicators mounted to the rails.

7.8 Tank

Tank should be made of all welded steel construction and preferably should include a separate section from the material to hold the control box, power supply, and motor/pump etc. to improve protection against vandalism.

Tank lid will include provisions for a locking mechanism to prevent unauthorized access to the tank and controls.

Each tank should be fitted with a seal to prevent entry of any foreign material, snow, sand, rain or other wind-born particulate matter. This seal should have the arrangement to allow easy field replacement, if necessary.

The bottom and sides of the tank should be such that it aids to easy flow of material to the pump.

Tanks should include lifting lugs. The minimum capacity of the tank should be 150 Kg for storage of lubricant.

7.9 Applicators

The application bars should clamp securely to the rail and be adjustable for different sizes of rails being used in India and distribution configurations. It should have coverage of minimum 2 Km with the recommended high quality rail-road lubricant. Temperature range should be same as for hose.

All bars should mount to rail in such a way so as to minimize the wastage of material from leakage around mounting.

The applicators should be multi-port configuration designed to deposit material uniformly along the length of the applicator. Internally, each applicator should incorporate passageways designed so as to equally balance distribution from each port opening. These passageways should be finished such as to minimize sticking and clogging of material within the applicators.

Gauge face lubrication applicators should be mounted such that gauge face lubricant is deposited onto the upper portion of the rail's gauge face so as to come in contact with wheel flange.

8.0 LUBRICANT

A suitable lubricant for heavy rail road traffic should be used which is compatible with the system. Its lubricity should be such that it should provide friction value of 0.25 μ or below. The carry down effect should be minimum 2.0 kms. Carry down effect is the distance from the location of lubricator, fixed in the track in the direction (s) of rail traffic up to which lubricant should be carried by the wheel flange effectively to reduce the rail wear and to fulfill all the performance requirements mentioned in this specification.

The lubricant should be non-inflammable, non-toxic and non-health hazard. It should not give adverse effect on rolling stock components and track components i.e. rails, sleepers, fastenings, ballast etc.

Lubricant should be resistant to both water and high temperatures. It should not get washed away in rain/ moist conditions and also should not get softened or rundown during high temperatures prevailing in the country.

The supplier will give detailed specifications of lubricant to comply the above requirement and scrutiny of the offer. The supplier will also furnish the average consumption rate of lubricant per actuating wheel for all types of lubricant suitable for the equipment being offered and their unit rates so that overall financial implication of the lubrication system offered by the tenderer can be arrived at by the tender committee.

The supplier of the equipment should ensure continuous supply of lubricant for at least three years for which a separate offer may be given. No price variation shall be entertained for lubricants during these three years.

Performance certificate for satisfactory service of the lubricant for various functional requirements as stated above in similar environment as prevailing in India must be submitted by tenderer/ supplier along with his offer. Such performance certificates should be issued by relevant user railways.

9.0 DOCUMENTATION

9.1 Documentation of the track based lubricator system should be supplied comprising of detail of diagram, electrical and electronic designs with descriptions, component materials/part number, equivalent international part number, component specification etc. along with explanatory notes and comments wherever necessary.

9.2 Calibration, operation, maintenance and troubleshooting manuals should be prepared in detail to the satisfaction of purchaser and supplied in six copies each.

10.0 PERFOMANCE CERTIFICATE

The application system (Lubricator and Lubricant) must be proven and should be functional in all climatic conditions in India. Performance Certificates in this regard from user railway systems shall be furnished by tenderer/ supplier along with the offer.

11.0 SPARE PARTS

11.1 Expected life of components should be listed along with their condemning limits. The component should be detailed in a separate list indicating description, part number, quantity and whether imported or indigenous.

11.2 The supplier should furnish list of components/spare parts which are expected to be required for trouble free operation and maintenance of the system for a period of 3 years after the warranty period indicating their description, part number, equivalent international part number, quantity and price. The price so quoted shall be valid for at least two years after the expiry of warranty period. The purchaser reserves the right to purchase these spares along with system and/or after expiry of warranty period. The manufacturer shall also guarantee availability of all required spare components to ensure trouble free service for at least ten years after warranty. For parts to be procured from the market, imported or indigenous, the sources and details should be provided.

12.0 TOOLS

All tools including measuring equipments required for diagnostics/fault finding and normal maintenance/repair should be supplied as a complete kit. The list of such tools and equipments proposed to be supplied with system should be furnished as a part of maintenance/repair manual.

13.0 WARRANTY

13.1 The supplier should ensure that system supplied including all parts, components etc. used is free from faults in manufacturing, design, material, workmanship and should be of the highest quality and in conformity with the contract specifications.

13.2 The warranty shall expire after 24 (twenty four) months from the date of acceptance i.e. from the date of issue of commissioning certificate after field validation of the system by purchaser.

13.3 Any part of the rail lubricating unit failing or proving unsatisfactory in service due to defective design, material or workmanship within two years from date of issue of commissioning certificate shall be replaced by the suppliers at his own expense. In the event of immobilization of rail lubrication unit owing to defect in design, material or workmanship, this warranty period shall be extended for the duration of the said period of immobilization. Further, should any design modification be made in any part of the equipment offered, the period of 24 months would commence from the date of modified part is commissioned in service. The cost of such modification shall be borne by the supplier.

13.4 The time limit for attending the defects during warranty period by the service engineer of supplier is 10 days from the date of registering of the complaint with him. A penalty of 1% of purchased price of the equipment, per week or part thereof, shall be imposed for delayed attention.

13.5 15% of the cost of the equipment shall be kept as "warranty bond" with the Railways, which shall be refunded on the expiry of warranty period. This can be in the form of bank guarantee also for the requisite period.

14.0 SERVICE ENGINEERS

The supplier should provide at his own expense the services of competent engineers during the warranty period for any manufacturing and design defects. Service engineers should be available for commissioning of rail lubricators for regular service, for imparting instructions to operating, repair and maintenance as mentioned in Para 16.3. These engineers should also advise the railways on appropriate maintenance tests in operating, repair and staff training facility.

15.0 INSPECTION

The inspection of rail lubricators shall be carried out by purchaser or his authorized representative.

16.0 TRAINING

16.1 Supplier should provide adequate training to four Indian Railway officials of Zonal Railway making procurement, in calibration, operation, repair and maintenance of the system.

16.2 The theoretical part of the training regarding repair and maintenance including explanation, flow chart etc. shall be completed before installation of system in the field.

16.3 A complete training programme covering system installation, operation, troubleshooting and maintenance should be offered, which shall be inclusive in the offer. This will be imparted during installation or any other suitable time mutually agreed by Railway Administration and the firm, to the satisfaction of Engineer In-charge.

16.4 In case any training is required abroad, the same should be specifically mentioned giving details.

17.0 AMC

Annual Maintenance Contract (AMC) for a period of minimum three years after completion of warranty period will be applicable. Tenderer(s) will, however, quote the cost of AMC separately. Cost of AMC for next five years i.e. "after warranty 3 years AMC" should be offered separately. The AMC will be without spares. Cost of spares and other details will be applicable as per Para 11.0 of these conditions.

TECHNICAL SPECIFICATION OF TRACK BASED LUBRICATORS (Hydraulic Type)

1.0 SCOPE

This specification covers the description, functional and performance parameters of hydraulic track based lubricators for gauge face lubrication. The delivery system should be specifically designed to apply lubricant on curves under different environmental and traffic conditions on Indian Railways.

2.0 DEVIATIONS

The tenderer shall furnish compliance or deviations, if any, for each clause and sub clause of the specifications along with technical explanations/details. The tenderer shall also furnish financial implications of the deviations if any.

3.0 SERVICE CONDITIONS

3.1 System should be able to work under following service conditions:

i	Ambient temperature	:	0^0C to 50^0C
ii	Rail temperature	:	(-) 10^0C to (+) 75^0C
iii	Humidity	:	40-100%
iv	Rainfall	:	Fairly heavy
v	Atmospheric condition	:	Very dusty, heavy fog

3.2 On IR network the electrified traction consists of overhead electric system of either 25000 V AC or 1500 V DC with residual return current passing through one of the rails in the track. The voltage for track circuits for signaling purpose is up to 12 volts and the corresponding current upto 1 amp. passes through the other rail. The lubricator system should be able to work in above stated electric traction and signaling system and its induction effect.

3.3 The lubricator system should be such that it does not affect the signaling system.

3.4 The firm should offer proven technology with lubricator and lubricant supplied by them and working satisfactorily in any reputed railway system of the world of similar environment prevailing in India. Certificate in this regard from relevant railway system shall be furnished.

4.0 DOCUMENTS TO BE SUPPLIED

i. Installation Manual
ii. Maintenance Manual
iii. Service Manual
iv. Parts Manual

5.0 FUNCTION

The applicator system should be a hydraulically powered pumping system for delivering an adjustable quantity of lubricating material to the rails in a manner such that passing wheels, would carry the desired amount of lubricant along the gauge face of rails.

6.0 SYSTEM DESCRIPTION

The application system must be proven system and should be functional in all climatic conditions in India.

The application system should consist of an actuator, a pump, a tank with cover, and a material distribution system of hoses and applicators attached to the rails. The whole system should be compatible with the lubricant as defined in para 8.0 of this specification.

The material should be pumped through main hose to a central distribution manifold where it may split into distribution hoses that connect to the multi-ported applicators clamped to the rail. The product should then travel to the dispensing ports of each applicator to deliver controlled amounts of product onto the rails. The product should then be picked-up by passing train wheels. The arrangement should be such that the optimum distribution of the product takes place both along circumference of wheel flange as well as longitudinally along gauge face of rails.

7.0 MAJOR COMPONENT SPECIFICATIONS

7.1 Actuator

It should be easy to install and easy to remove for servicing. It should operate through a closed loop hydraulic system that delivers consistent pressure. While it should be a wheel actuated actuator, the conversion of train wheel energy into the impulses of hydraulic power must be independent of train wheel speed.

It should be adjustable to compensate for train speed and wear on head of rails. Also it should be bi-directional.

7.2 Pump

It should be an efficient, compact and hydraulically powered motor driving lubricant pump. It should require little maintenance and be easy to prime. Pump should be capable of handling a wide range of viscosities, from the stiffest of lubricant to the most fluid. Pump should be able to produce adequate minimum pressure required for pumping the desired quantity of lubricant from the lubricant chamber to track rail gauge face for various lifts/heights as per site conditions during passage of train and to perform all the functions of gauge face lubricator. Pump should be mounted in such a way that the pump's inlet port mates directly to tank's outlet near bottom of tank. Between the

pump and material there should be a large mesh screen. The supplier will submit the detailed specifications of pump for technical scrutiny of the offer.

7.3 Lubricant distribution system

Shut off valve or any other suitable lubricant distribution system should be used to control the flow of lubricant to the applicators. Distribution system should be efficient, able to distribute the lubricant evenly. It should preferably have minimum moving parts. It should require minimum and easy maintenance.

7.4 Hose

Hoses used with the application system should be connected via screw-type connections to the tank and manifold.
Specific performance and functional requirements are:

Outlet hose:	May be wire-braided.
Distribution hoses:	Must be non-conductive type hose.
Inner Tube:	Suitable Oil Resistant Material.
Cover Construction:	Suitable Oil Resistant Material.
Reinforcement:	Suitably reinforced.
Temperature Range:	Ambient temperature 0^0C to 50^0C or Rail Temperature (-) 10^0C to (+) 75^0C.
Burst Press Min.:	84.37 Kgf/ cm^2 (1200 PSI)
Fittings:	Cast or forged brass alloy end fittings with cast or spun brass ferrules.

Manifold valve handles should be removable for easy storage in the dry chamber of the tank.

Distribution hoses should be long enough to supply applicators mounted to the rails.

7.5 Tank

Tank should be made of all welded steel construction and preferably should include a separate section from the material to hold the control box, power supply, motor/pump etc. The vendor has to provide satisfactory solution to make complete unit theft proof / vandalism proof and safety against damage to any part of the equipment. The steel tank containing the complete equipment including control panel etc. should be enclosed in a suitably designed concrete/ masonry room having separate door with lock and key arrangements. The above planning and execution of work is to be done by vendor himself along with installation of the equipment. If required, vender is to submit the necessary drawings to comply this requirement.

Tank lid will include provisions for a locking mechanism to prevent unauthorized access to the tank and controls.

Each tank should be fitted with a seal to prevent entry of any foreign material, snow, sand, rain or other wind-born particulate matter. This seal should have the arrangement to allow easy field replacement, if necessary.

The bottom and sides of the tank should be such that it aids to easy flow of material to the pump.

Tanks should include lifting lugs. The minimum capacity of the tank should be 150 Kg for storage of lubricant.

7.6 Applicators

The application bars should clamp securely to the rail and be adjustable for different sizes of rails being used in India and distribution configurations. It should have coverage of minimum 2 Km with the recommended high quality rail-road lubricant. Temperature range should be same as for hose.

All bars should mount to rail in such a way so as to minimize the wastage of material from leakage around mounting.

The applicators should be multi-port configuration designed to deposit material uniformly along the length of the applicator. Internally, each applicator should incorporate passageways designed so as to equally balance distribution from each port opening. These passageways should be finished such as to minimize sticking and clogging of material within the applicators.
Gauge face lubrication applicators should be mounted such that gauge face lubricant is deposited onto the upper portion of the rail's gauge face so as to come in contact with wheel flange.

8.0 LUBRICANT

A suitable lubricant for heavy rail road traffic should be used which should be compatible with the system. Its lubricity should be such that it should provide friction value of 0.25 μ or below. The carry down effect should be minimum 2.0 kms. Carry down effect is the distance from the location of lubricator, fixed in the track in the direction(s) of rail traffic up to which lubricant should be carried by the wheel flange effectively to reduce the rail wear and to fulfill all the performance requirements mentioned in this specification.

The lubricant should be non-inflammable, non-toxic and non-health hazard. It should not give adverse effect on rolling stock components and track components i.e. rails, sleepers, fastenings or ballast.

Lubricant should be resistant to both water and high temperatures. It should not get washed away in rain/ moist conditions and also should not get softened or rundown during high temperatures prevailing in the country.

The supplier will give detailed specifications of lubricant to comply the above requirement and scrutiny of the offer. The supplier will also furnish the average consumption rate of lubricant per actuating wheel for all types of lubricant suitable for the equipment being offered and their unit rates so that overall financial implication of the lubrication system offered by the tenderer can be arrived at by the tender committee.

The supplier of the equipment should ensure continuous supply of lubricant for at least three years for which a separate offer may be given. No price variation shall be entertained for lubricants during these three years.

Performance certificate for satisfactory service of the lubricant for various functional requirements as stated above in similar environment as prevailing in India must be submitted by tenderer/ supplier along with his offer. Such performance certificates should be issued by relevant user railways.

9.0 DOCUMENTATION

9.1 Documentation of the track based lubricator system should be supplied comprising of detail of diagram, hydraulic designs with descriptions, component materials/part number, equivalent international part number, component specification etc. along with explanatory notes and comments wherever necessary.

9.2 Calibration, operation, maintenance and troubleshooting manuals should be prepared in detail to the satisfaction of purchaser and supplied in six copies each.

10.0 PERFOMANCE CERTIFICATE

The application system (Lubricator and Lubricant) must be proven and should be functional in all climatic conditions in India. Performance Certificates in this regard from user railway systems shall be furnished by tenderer/ supplier along with the offer.

11.0 SPARE PARTS

11.1 Expected life of components should be listed along with their condemning limits. The component should be detailed in a separate list indicating description, part number, quantity and whether imported or indigenous.

11.2 The supplier should furnish list of components/spare parts which are expected to be required for trouble free operation and maintenance of the system for a period of 3 years after the warranty period indicating their description, part number, equivalent international part number, quantity and price. The price so quoted shall be valid

for at least two years after the expiry of warranty period. The purchaser reserves the right to purchase these spares along with system and/or after expiry of warranty period. The manufacturer shall also guarantee availability of all required spare components to ensure trouble free service for at least ten years after warranty. For parts to be procured from the market, imported or indigenous, the sources and details should be provided.

12.0 TOOLS

All tools including measuring equipments required for diagnostics/fault finding and normal maintenance/repair should be supplied as a complete kit. The list of such tools and equipments proposed to be supplied with system should be furnished as a part of maintenance/repair manual.

13.0 WARRANTY

13.1 The supplier should ensure that system supplied including all parts, components etc. used is free from manufacturing and faults in design, material, workmanship and should be of the highest quality and in conformity with the contract specifications.

13.2 The warranty shall expire after 24 (twenty four) months from the date of acceptance i.e. from the date of issue of commissioning certificate after field validation of the system by purchaser.

13.3 Any part of the rail lubricating unit falling or proving unsatisfactory in service due to defective design, material or workmanship within two years from date of issue of commissioning certificate shall be replaced by the suppliers at his own expense. In the event of immobilization of rail lubrication unit owing to defect in design, material or workmanship, this warranty period shall be extended for the duration of the said period of immobilization. Further, should any design modification be made in any part of the equipment offered, the period of 24 months would commence from the date of modified part is commissioned in service. The cost of such modification shall be borne by the supplier.

13.4 The time limit for attending the defects during warranty period by the service engineer of supplier is 10 days from the date of registering of the complaint with him. A penalty of 1% of purchased price of the equipment, per week or part thereof, shall be imposed for delayed attention.

13.5 15% of the cost of the equipment shall be kept as "warranty bond" with the Railways, which shall be refunded on the expiry of warranty period. This can be in the form of bank guarantee also for the requisite period.

14.0 SERVICE ENGINEERS

The supplier should provide at his own expense the services of competent engineers during the warranty period for any manufacturing and design defects. Service engineers should be available for commissioning of rail lubricators for regular service, for imparting instructions to operating, repair and maintenance as mentioned in Para 16.3. These engineers should also advise the railways on appropriate maintenance tests in operating, repair and staff training facility.

15.0 INSPECTION

The inspection of rail lubricators shall be carried out by purchaser or his authorized representative.

16.0 TRAINING

16.1 Supplier should provide adequate training to four Indian Railway officials of Zonal Railway making procurement, in calibration, operation, repair and maintenance of the system.

16.2 The theoretical part of the training regarding repair and maintenance including explanation, flow chart etc. shall be completed before installation of system in the field.

16.3 A complete training programme covering system installation, operation, troubleshooting and maintenance should be offered, which shall be inclusive in the offer. This will be imparted during installation or any other suitable time mutually agreed by Railway Administration and the firm, to the satisfaction of Engineer In-charge.

16.4 In case any training is required abroad, the same should be specifically mentioned giving details.

17.0 AMC

Annual Maintenance Contract (AMC) for a period of minimum three years after completion of warranty period will be applicable. Tenderer(s) will, however, quote the cost of AMC separately. Cost of AMC for next five years i.e. "after warranty 3 years AMC" should be offered separately. The AMC will be without spares. Cost of spares and other details will be applicable as per Para 11.0 of these conditions.